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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/778,996	02/07/2001	Konstantinos I. Papathomas	END920000065US1	8725

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EXAMINER

SELLERS, ROBERT E

ART UNIT	PAPER NUMBER
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1712

DATE MAILED: 11/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/778,996

Applicant(s)

PAPATHOMAS, KONSTANTINOS  
I.

Examiner

Robert Sellers

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 06 October 2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1, 14, 18, 41, 43, 44, 46, 47, 51-54, 56-62, 75-78 and 80-98 is/are pending in the application.
- 4a) Of the above claim(s) 47, 56, 67, 80 and 81 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 14, 18, 41-43, 44, 46, 51-54, 58-62, 75-78 and 82-98 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

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Claim 47 is withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Claims 56, 57, 80 and 81 are directed to non-elected species of flexibilizing agent. The election of the flexibilizer blend of claims 54 and 78 wherein the first flexibilizer is bis(2,3-epoxy-2-methylpropyl)ether and the thermoplastic is a poly(arylene)ether as denoted in claims 88 and 94 precludes the soluble thermoplastic alone defined in claims 56, 57, 80 and 81. The election were made **without** traverse in the reply filed on October 6, 2005.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

1. Claims 91 and 97 contains the trade name Triton X-100. Where a trade name is used in a claim as a limitation to identify or describe a particular material or product, the claim does not comply with the requirements of 35 U.S.C. 112, second paragraph. (*Ex parte Simpson*, 218 USPQ 1020, Board of Appeals, 1982). The claim scope is uncertain since the trade name cannot be used properly to identify any particular material or product.

A trade name is used to identify a source of goods, and not the goods themselves. Thus, a trade name does not identify or describe the goods associated with the trade name. In the present case, the trade name is used to designate a particular species of surfactant without a chemical identification. Accordingly, the identification is indefinite.

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2. Triton X-100 should be identified as polyethylene glycol -p-tert-octylphenyl ether in the specification on page 22, line 23 as substantiated by Chemical abstracts registry no. 9002-93-1. The trade name should be replaced with the chemical name in claims 91 and 97.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 18, 51-53, 59-62, 75-77 and 83-86 rejected under 35 U.S.C. 102(e) as being anticipated by Shiobara et al. Patent No. 6,376,100.

3. Shiobara et al. (Figure 1 and col. 13, lines 20-29) reports an underfill material 4 filling the gap between an organic substrate 1 and a semiconductor chip 3 wherein the underfill material is prepared by the separate mixing (col. 13, lines 5-9) of any epoxy resin having at least two epoxy groups per molecule (col. 2, lines 46-48), a spherical inorganic filler possessing a particle size of up to 50 microns (col. 3, lines 20-29), from 2 to 15 parts by weight per 100 parts by weight of the epoxy resin (col. 12, lines 57-61) of a stress reducing agent which is an epoxy-functional organopolysiloxane copolymer (col. 9, lines 16-21 and col. 12, lines 11-56) and dyestuffs (col. 12, line 66).

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The stress reducing agent is within the realm of the claimed flexibilizing agent which encompasses an epoxy-terminated elastomer of a polysiloxane according to the specification on page 19, lines 23, 26-27 and 29-31.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 14, 18, 41, 43, 44, 46, 51-54, 58-62, 75-78, 82-88, 90-94, 96-98 are rejected under 35 U.S.C. 103(a) as being unpatentable over Christie et al. Patent No. 5,668,059; Papathomas et al. Patent No. 6,790,473 and Johansson et al. Patent No. 6,090,474 in view of Shiobara et al. Patent No. 6,376,100.

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4. Christie et al. (Figure 1 and col. 3, lines 51-67) discloses an encapsulant 5 disposed between a chip carrier 2 and a semiconductor chip 1 as required in independent claim 18 wherein the encapsulant comprises directed to an encapsulant for a semiconductor device obtained from the elected species of **3,4-epoxycyclohexylmethyl-3,4-epoxycyclohexane carboxylate** (col. 4, lines 28-29) of claims 87 and 93, from about 5 to about 30% of a **flexibilizer** which imparts thermal shock resistance and crack resistance (col. 11, lines 14-30), a **filler** having a particle size of not greater than 31 microns **treated** with about 0.25% by weight of a coupling agent such as the elected species of  **$\beta$ -(3,4-epoxycyclohexyl)ethyltrimethoxysilane** (col. 9, lines 49-50 and 57-62) of claims 90 and 96, from about 0.5% to about 3% of a **surfactant** such as the elected species of **Triton X-100** (col. 10, lines 60-64) of claims 91 and 97. and less than about 0.2% by weight of an organic dye such as the elected species of nigrosine (col. 11, lines 34-36) of claims 60, 92, 84 and 98.

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5. Papathomas et al. '473 (Figure 3 and col. 6, lines 29-37) sets forth an encapsulant 61 dispensed between a substrate 11 and integrated circuit chip electronic package 31 wherein the encapsulant contains **3,4-epoxycyclohexylmethyl-3,4-epoxycyclohexane carboxylate** (col. 12, lines 47-48 and col. 20, Example 1, line 23), from about 4% to about 30% by weight (col. 20, lines 7-9) of a toughening agent or **flexibilizer** (col. 18, line 6) including a blend of a thermoplastic such as the elected species of a **poly(arylene ether)** (col. 18, lines 25-26) dissolved in an epoxy resin monomer (col. 19, lines 53-60) such as the elected species of **bis(2,3-epoxy-2-methylpropyl)ether** (col. 19, lines 27-28) which increases the fracture toughness while reducing the overall viscosity (col. 18, lines 64-67 and col. 19, lines 56-60), a **filler** possessing a particle size of 31 microns or less (col. 17, lines 26-27), and from about 0.5% to about 3% of a **surfactant** such as **Triton X-100** (col. 16, lines 55-60).
6. Johansson et al. (col. 3, lines 4-13) espouses the filling of plated through-holes of a carrier placed onto a printed circuit board with a formulation containing especially preferred **ERL-4221** cycloaliphatic epoxy resin (col. 6, lines 15-17), from about 5-15% by weight of a **flexibilizer** (col. 10, lines 52-53), a **filler** with a particle size of from about 0.1 to about 75 microns, and a **surfactant** (col. 10, lines 35-38).
7. The claimed filler in spherical or spheroidal form is not recited. Shiobara et al. is described hereinabove.

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It would have been obvious to employ the fillers of Papathomas et al. '930 and '473 and Johansson et al. in the spherical form of Shiobara et al. in order to facilitate the infiltration of the encapsulant into narrow gaps, augment the bonds between the inorganic filler surface and epoxy resin as well as between the epoxy resin and silicon chip, and eliminate the presence of voids (Shiobara et al., col. 1, line 63 to col. 2, line 6).

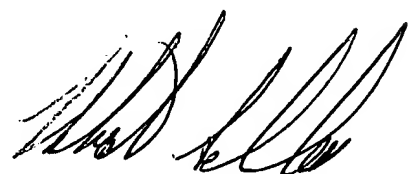
Claims 89 and 95 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shiobara et al., Christie et al., Papathomas et al. and Johansson et al. as applied to claims hereinabove and further in view of the Materials Research Society Symposium Proceedings article by Shi et al.

8. The claimed zirconium tungstate as the filler is not recited. Shi et al. teaches the use of zirconium tungstate as a filler in an epoxy resin composite for electronic applications. It would have been obvious to employ the zirconium tungstate of Shi et al. as the filler of Shiobara et al., the Papathomas et al. patents and Johansson et al. in order to impart a negative coefficient of thermal expansion to the encapsulants.

Papathomas et al. Patent No. 5,194,930 previously cited in the Notice of References Cited, Form PTO-892 of the restriction and election of species requirement mailed September 8, 2005 has not been applied since it is essentially equivalent to Christie et al. without the nigrosine organic dye.

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Monday to Friday, 9:30 to 6:00

rs 11/2/2005



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PRIMARY EXAMINER